



Thakur Educational Trust's (Regd.)

**THAKUR RAMNARAYAN
COLLEGE OF ARTS & COMMERCE**

ISO 21001:2018 Certified

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Outcome Based Education (OBE) Document

**Programme: B.Sc. (C.S.)
F.Y.B.Sc.(C.S.)**

Program Educational Objectives

PEO 1: To prepare students for a career in Computer Science and its applications such as the design, development, implementation, testing and maintenance of computer software/hardware in a professional career.

PEO 2: To develop the skill sets of students to be at par with the advancements in the Computer Science domain.

PEO 3: To prepare the student for entry into a program of postgraduate study in Computer Science and related domains/ fields.

Program Outcomes

On successful completion, graduates of B.Sc. (C.S.) programme will be able to:

PO 1: Disciplinary Knowledge: Apply the knowledge of mathematics, computer science and Information Technology fundamentals to find solutions of real time problems with different applications.

PO 2: Effective Communication Skills: Communicate effectively on complex activities with the end users and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 3: Critical thinking: Take informed actions after identifying the assumptions that frame our thinking and actions, testing out the degree to which these assumptions are accurate and valid, and looking at our ideas and decisions (intellectual, organizational, and personal) from different perspectives.

PO 4: Problem Solving: Identify, formulate, research literature, and analyse various research and real time application scenarios reaching substantiated conclusions using first principles of mathematics, computer sciences, and information technology.

PO 5: Analytical Reasoning: Develop ability to analyse a problem, identify and define applications that resolves the end user requirement with respect to real time problems with appropriate consideration for the societal, and environmental considerations.

PO 6: Research Related Skills: Use research-based knowledge and research methods to investigate the problems that cannot be solved by straightforward application of knowledge, theories and techniques; that may not have a unique solution, which need to be defined (modelled) within appropriate mathematical framework/ scientific derivation/ global technological evolutions.

PO 7: Environment and Sustainability: Understand the impact of the scientific applications and solutions in societal and environmental contexts, and demonstrate the knowledge of green computing and need for sustainable development.

PO 8: Cooperation/ Teamwork: Function effectively as an individual, and as a member or team leader in diverse cross functional groups and in multidisciplinary settings.

PO 9: Information/Digital Literacy: Create, select, and apply appropriate techniques, resources, and modern tools including prediction and modelling to complex activities with an understanding of the limitations.

PO 10: Ethics: Apply ethical principles and commit to professional ethics & responsibilities and norms of technological and sustainable development.

PO 11: Self-directed and Life-long Learning: Recognize the need for and have the preparation and ability to engage independent and lifelong learning in the broadest context of global technological evolution.

PO 12: Leadership Readiness/Qualities: Demonstrate knowledge and understanding of the Computer Science, Information Technology and Management principles and apply these to one's own work, as a member and leader in a team, to manage research and application projects and in multidisciplinary environments.

Program Specific Outcomes

On successful completion, graduates of B.Sc. (C.S.) programme will be able to:

PSO 1: Demonstrate technical knowledge and illustrate the required skills for software development with the help of basic hardware components. Apply standard software engineering practices and strategies in the development using open-source programming environment.

PSO 2: Develop the skills of logical thinking, analytical thinking & acquire essential skills of both verbal as well as non-verbal communication.

PSO 3: Apply concepts of wired, wireless, embedded and IoT systems for demonstrating innovative solutions with consideration to real-time applications. Develop knowledge of basic concepts of computer network, security and software testing.

PSO 4: Acquaint with contemporary issues, latest trends in technological evolution and thereby develop new ideas and design new solutions to existing problems.

F.Y.B.Sc. (C.S.) (Semester - I)

MJ - Digital Systems & Architecture (1101111)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Learn how number system and codes are useful in computer system design.		✓				
CO2	Learn how Flip Flops are useful in memory design and data communication through CPU and Memory and I/O devices.			✓			
CO3	Learn about basics of instruction sets and its types.	✓					
CO4	Learn about Processor Internal Architecture and Design.				✓		

MJ - Fundamentals of Database Systems (1101112)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	To appreciate the importance of database design.		✓				
CO2	Analyze database requirements and determine the entities involved in the system and their relationship to one another.				✓		
CO3	Write simple queries to MySQL related to String, Maths and Date Functions.			✓			
CO4	Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands			✓			
CO5	Understand the normalization and its role in the database design process.		✓				
CO6	Handle data permissions.			✓			
CO7	Create indexes and understands the role of Indexes in optimization search.		✓				

F.Y.B.Sc. (C.S.) (Semester - I)

Major - Computer Science Practical 1 (P1- DSA, FDBS) (1101113)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Verify truth tables of various logic gates			✓			
CO2	Simplify given Boolean expressions and implement them using Logisim.			✓			
CO3	Design and validate the operation of various combinational circuits using Logisim.						✓
CO4	Understand the behavior and applications of flip-flops in digital systems.		✓				
CO5	Design and implement expressions using multiplexers/demultiplexers in Logisim.						✓
CO6	Create and maintain relational databases, applying normalization principles.			✓			
CO7	Write simple queries to MySQL related to String, Maths and Date Functions.			✓			
CO8	Create tables and insert/update/delete data, and query data in a relational DBMS using MySQL commands.			✓			
CO9	Handle data permissions.			✓			

F.Y.B.Sc. (C.S.) (Semester - I)

VSC - Introduction to Python Programming (1101411)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Apply Python features for diverse programming tasks confidently.			✓			
CO2	Implement control flow statements for precise program execution.			✓			
CO3	Manipulate arrays, strings, and data structures with precision and ease.			✓			
CO4	Create modular, efficient code using functions, modules, and strings.						✓
CO5	Skillfully manage files, utilize regular expressions, and work with date and time for program efficiency.			✓			

F.Y.B.Sc. (C.S.) (Semester - I)

SEC - Statistics with R Programming (1101412)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Confidently navigate Studio, R GUI, and manage data in R.			✓			
CO2	Fluent implementation of expressions, assignments, and loops in R.			✓			
CO3	Use R data structures for effective data management.			✓			
CO4	Efficiently manipulate and operate on character strings in R.			✓			
CO5	Apply statistical functions, regression analysis, and distribution functions with confidence.			✓			

F.Y.B.Sc. (C.S.) (Semester - I)
SEC - LINUX Operating System (1101413)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Work with Linux file system structure, Linux Environment		✓				
CO2	Handle shell commands for scripting, with features of regular expressions, redirections			✓			
CO3	Implement file security permissions			✓			
CO4	Work with vi, sed and awk editors for shell scripting using various control structures			✓			
CO5	Install software like compilers and develop programs in C and Python programming languages on Linux Platform						✓

F.Y.B.Sc. (C.S.) (Semester - I)
OE - Stress Management (1331311)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Students are able to find and explain various concepts of stress.		✓				
CO2	Students can explain the role of psycho physiology plays in stress, illness and disease. Students can give example and site researches for the same.			✓			
CO3	Students can compare different types of stressors and contrast to them to different kind of situations.				✓		
CO4	Students can explain Intrapersonal and interpersonal Interventions to manage stress.		✓				

F.Y.B.Sc. (C.S.) (Semester - I)

OE - Quantitative Techniques-I (1051311)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	understand the integers, rational numbers, real numbers and their operations.		✓				
CO2	learn the concepts of GCD, LCM.	✓					
CO3	understand the concepts related to averages and percentages, such as arithmetic mean, geometric mean, harmonic mean		✓			✓	
CO4	evaluate the ratios and proportions						
CO5	understand the Profit, Loss, Percentage Profit and Percentage Loss.		✓				
CO6	learn the concepts related to Time, Speed and Distance.		✓				

F.Y.B.Sc. (C.S.) (Semester - I)

AEC - Introduction to Communication Skills I (2511511)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Demonstrate an understanding of essential aspects of communication skills		✓				
CO2	Exhibit the ability to Read a variety of written text using subskills such as skimming and scanning.			✓			
CO3	Identify and rectify common grammatical errors in English.			✓			
CO4	Show competence in delivering compelling presentations and engage in articulate and effective conversations in English across different contexts.			✓			
CO5	Display advanced formal writing skills in crafting job application letters, CVs, and Statements of Purpose.						✓

F.Y.B.Sc. (C.S.) (Semester - I)

VEC - Law related to Intellectual Property Rights (2541513)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Learners will understand the concept of IPR and analyze the concept of liabilities.				✓		
CO2	Learners will be able acquire the knowledge of the fundamentals of Intellectual property right and judicial perspective towards persons and properties		✓				
CO3	Learners will be able to evaluate the process of IPR mechanism set by the government.					✓	

F.Y.B.Sc. (C.S.) (Semester - I)

IKS - Indian Knowledge System Series (Generic) – I (2531511)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Learner will understand and appreciate the rich Indian Knowledge Tradition		✓				
CO2	Learner will understand the contribution of Indians in various fields		✓				
CO3	Learner will experience increase subject-awareness and self-esteem		✓				
CO4	Learner will develop a comprehensive understanding of how all knowledge is ultimately intertwined		✓				

F.Y.B.Sc. (C.S.) (Semester - I)

CC- Introduction to Cultural Activities (2521611)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Learner will understand the significance of cultural activities		✓				
CO2	Learner will develop sensitivity towards Indian culture and its preservation		✓				
CO3	Learner will be apply the knowledge and skills of the cultural activities in their practical life			✓			
CO4	Learner will participate in the various cultural activities			✓			

F.Y.B.Sc. (C.S.) (Semester - I)

**CC- Introduction to Sports, Physical Literacy, Health and Fitness and
Yog (2521615)**

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	1. The curriculum would enable the pass out students to be entrepreneur (to start their own fitness center, gym, yoga studio etc.) and device appropriate fitness program for different genders and age groups at all level						✓
CO2	The curriculum would enable to officiate, supervise various sports events and organize sports events.			✓			
CO3	Students acquire the knowledge of Physical Education, Sports and Yoga and understand the purpose and its development.		✓				
CO4	The student learns to plan, organize and execute sports events.						✓
CO5	Student will learn theoretical and practical aspects of game of his choice to apply at various levels for teaching, learning and coaching purposes efficiently.			✓			
CO6	Student acquires the knowledge of opted games, sports and yoga and also learns the technical and tactical experience of it.		✓				
CO7	Student will learn to apply knowledge of Physical fitness and exercise management to lead better quality life.			✓			
CO8	Students will understand and learn different dimension of active life style.		✓				
CO9	Student will learn the knowledge of		✓				

	nutrition and diet.						
CO10	Students will be able to assess the physical fitness in a scientific way.			✓			
CO11	The students will be able to continue professional courses and research in Physical Education, sports and yoga.						✓
CO12	It helps the student to understand theory and practical aspects of physical literacy. These aspects include role of motivation and confidence, how to focus on positive experience, new styles of teaching, inclusive session planning and review the progress in physical activities.		✓				

F.Y.B.Sc. (C.S.) (Semester - I)
CC- National Service Scheme (2521612)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Students will comprehend fundamental ideas and facts about the National Service Program.		✓				
CO2	Students will learn the essentials of NSS-related procedures.		✓				
CO3	Students will learn social work skills (such as Voter Awareness, Campus Cleanup, Tree Plantation, and Rallies).			✓			

F.Y.B.Sc. (C.S.) (Semester - II)

MJ - Design and Analysis of Algorithms (1102111)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Students should be able to understand and evaluate efficiency of the programs that they write based on performance of the algorithms used.					✓	
CO2	Students should be able to appreciate the use of various data structures as per need		✓				
CO3	To select, decide and apply appropriate design principle by understanding the requirements of any real life problems.			✓			

F.Y.B.Sc. (C.S.) (Semester - II)

MJ - Introduction to OOP using C++ (1102112)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	The learner will be able to understand, remember, demonstrate, explain and describe concept of OOP		✓				
CO2	The learner will be able to design UML based diagrams						✓
CO3	The learner will be able to illustrate the different types of control statements in C++			✓			
CO4	The learner will be able to analyze and implement concept of OOP				✓		
CO5	The learner will be able to write and create programs relating to OOP concepts						✓

F.Y.B.Sc. (C.S.) (Semester - II)

MJ- Computer Science Practical 2 - (DAA, OOP) (1102113)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	OC 1. Design and implement algorithms for various problem domains.						✓
CO2	Evaluate and compare the time and space complexities of algorithms.					✓	
CO3	Apply divide and conquer strategies to solve computational problems.			✓			
CO4	Utilize dynamic programming techniques for optimization problems.			✓			
CO5	Implement and analyze algorithms based on greedy strategies.				✓		
CO6	Design and implement classes and objects in C++.						✓
CO7	Apply inheritance and polymorphism concepts in program development.			✓			
CO8	Implement operator overloading for enhanced class functionality.			✓			
CO9	Utilize advanced features like friend functions, inline functions, and this pointer.			✓			
CO10	Understand the impact of scope specifiers on class members.		✓				

F.Y.B.Sc. (C.S.) (Semester - II)
VSC - Web Designing (1102411)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Design valid, well-formed, scalable, and meaningful pages using emerging technologies.						✓
CO2	Understand the various platforms, devices, display resolutions, viewports, and browsers that render websites		✓				
CO3	Develop and implement client-side and server-side scripting language programs.			✓			
CO4	Develop and implement Database Driven Websites.			✓			
CO5	Design and apply XML to create a markup language for data and document centric applications.			✓			

F.Y.B.Sc. (C.S.) (Semester - II)

SEC - Advanced Python Programming (1102413)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Demonstrate comprehensive OOPs proficiency, apply principles effectively.			✓			
CO2	Develop efficient, reusable classes, successfully transfer members.						✓
CO3	Ability to implement inheritance and apply advanced polymorphism.			✓			
CO4	Ability to implement abstract classes, demonstrate flexibility through interfaces.			✓			
CO5	Ability to thread creation, synchronization, and effective deadlock resolution.			✓			

F.Y.B.Sc. (C.S.) (Semester - II)

VEC - Foundation of Behavioral Skills – Basic Level (2541515)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Learners will be able to Define and Identify different life skills required in personal and professional life	✓					
CO2	Learners will develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.			✓			
CO3	Learners will be able to explain the basic mechanics of effective communication and demonstrate these through presentations and take part in group discussions			✓			
CO4	Learners will be able to use appropriate thinking and problem-solving techniques to solve new problems			✓			

F.Y.B.Sc. (C.S.) (Semester - II)
OE - Leadership Management ()

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Generate social sensitization among youth of the nation.						✓
CO2	Students will explore various leadership theories and their applications in real-world scenarios				✓		
CO3	Learner should develop effective communication skills for leading and motivating teams			✓			
CO4	Analyze the dynamics of teamwork and foster a collaborative work environment				✓		

F.Y.B.Sc. (C.S.) (Semester - II)
OE - Content Writing (1461311)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Develop an understanding of the basic concepts in Content Writing		✓				
CO2	Exhibit the ability to understand and differentiate among the various media for which content is written				✓		
CO3	Develop the ability to write content and edit it suitably			✓			
CO4	Exercise creative writing skills.						✓
CO5	To develop analytical, researching, and better comprehension skills.				✓		

F.Y.B.Sc. (C.S.) (Semester - II)

MN - Industry and Service Management I (Basics of I & S) (1282211)

Course Outcomes

After completing this course, students will be able to:

CO	Course Outcomes	Revised Bloom's Taxonomy Learning Levels					
		R	U	A	N	E	C
CO1	Learners should Differentiate between various industry types and their characteristics				✓		
CO2	Identify the key factors influencing industry performance and competition		✓				
CO3	Understand the core principles of service management and customer experience		✓				
CO4	Analyse the challenges and opportunities unique to service businesses				✓		